BIRTH ORDER AND ACHIEVEMENT: A STUDY OF THE EFFECTS OF FAMILY CONSTELLATION AND RELATED VARIABLES ON THE ACHIEVEMENT OF OFFICER STUDENTS AT THE NAVAL POSTGRADUATE SCHOOL

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Monterey, California

THESIS

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by

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The findings further suggest that sibling-identification may affect the occupational achievement of last-born offspring, while parental activity appears to influence the academic and occupational achievement of first- and only-born children. Last-born offspring appear to do better in occupations

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The findings further suggest that sibling-identification may affect the occupational achievement of last-born offspring, while parental activity appears to influence the academic and occupational achievement of first- and only-born children. Last-born offspring appear to do better in occupations predominated by co-workers of the same sex as their next-older sib. For the Last-Born in an occupation predominated by co-workers of the opposite sex of his next-older sib, occupational achievement correlated positively with an increase in the age space between the Last-Born and his next-older sib.

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I. INTRODUCTION

A. BIRTH ORDER EFFECTS

1. First-Borns and Achievement

There is a seeming pre-eminence of first-born offspring in our world, particularly in the areas of achievement and academics. Behavioral Scientist Stanley Schachter, of Columbia University, sums up the variety of studies linking birth-order and achievement by saying that first-borns predominate "with astounding consistency."[1] They are over-represented in "Who's Who." The five U. S. presidents at or near the top in virtually every ranking -- George Washington, Abraham Lincoln, Thomas Jefferson, Woodrow Wilson, and Franklin D. Roosevelt -- were all first-borns.[2] And of the twenty-three astronauts who have so far traveled in space, no fewer than twenty-one are either only children or first-borns. (This is remarkable, when you consider that later borns outnumber first-borns by approximately two to one in the general population.) Even the exceptions are not truly different; Astronaut Don F. Eisele's older brother died in infancy, while Lt. Col. Michael Collins is thirteen years younger than his older brother.

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[1] Schachter, Stanley, The Psychology of Affiliation, Stanford University Press, 1959.

[2] Note that four of the five were involved in a major war, as also was President Lyndon Johnson, another first-born!

First- and only-borns are also pre-eminent among college students. In a study conducted at The University of California at Santa Barbara, over 60% of all entering students were first-born or only children.[3] Another comparison of observed birth orders with national census data indicated a significant over-representation of first-borns in the college population for both Anglos and Spanish families.[4] And, a recent analysis of National Merit Scholarships showed that 60% of the 1,618 finalists were first- or only-born.

Several psychological theories have been proferred in explanation for first- and only-born pre-eminence in achievement and academics. One is that the oldest child often starts off with much affection and concern from anxious and unskilled parents. Hilton (1967) found that mothers with their first-born were significantly more interfering, extreme, and inconsistent than mothers with their later-born.[5] Rothbart (1971) found that mothers gave more complex technical explanations to first-born, exhibited greater pressure for achievement, and displayed greater anxious intrusiveness into the

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[3]Altus, William D., "Birth Order and Academic Primogeniture," Journal of Personality and Social Psychology, v. 2, p. 872-876, December 1965.

[4]Greene, Roger L. and Clark, John R., "Birth Order and College Attendance in A Cross-Cultural Setting," Journal of Social Psychology, v. 75, p. 289-290, August 1968.

[5]Hilton, Irma, "Differences in The Behavior of Mothers toward First- and Later-Born Children," Journal of Personality and Social Psychology, v. 7, p. 282-290, December 1967.

performance of the first-born, (in comparison with later-borns) particularly in the mother's behavior toward the first girl.[6]

2. Effect of Later Siblings on The First-Born

With the arrival of another child, the first-born experiences a drop-off in affection and attention which later children do not suffer (Lasko, 1954).[7] Oldest girls in particular show evidence of stress (MacFarlane, Allen and Honzek, 1954).[8] The older child cannot compete with a younger one in behavior which elicits attention or cuddling as well as he can compete, by virtue of his maturity, in intellectual or physical skill which brings esteem. Thus oldest children, especially girls, often show some advantage over persons of other sibling positions on tests of verbal intelligence (Koch, 1954;[9] Rosenberg and Sutton-Smith, 1966).[10]

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[6]Rothbart, Mary K., "Birth Order and Mother-Child Interaction in An Achievement Situation," Journal of Personality and Social Psychology, v. 17, p. 113-120, February 1971.

[7]Lasko, Joan K., "Parental Behavior toward First and Second Children," Genetic Psychology Monographs, v. 49, p. 97-137, 1954.

[8]MacFarlane, Jean W., and others, "A Developmental Study of The Behavior Problems of Normal Children between Twenty-One Months and Fourteen Years," University of California Publication in Child Development, v. 2, ch. 9, 1954.

[9]Koch, Helen, "The Relationship of 'Primary Mental Abilities' in Five- and Six-Year-Olds to Sex of Child and Characteristics of His Sibling," Child Development, v. 25, p. 209-223, 1954.

[10]Rosenberg, B.G. and Sutton-Smith, B., "Family Interaction Effects on Masculinity-Feminity," Journal of Personality and Social Psychology, v. 8, p. 117-120, February 1968.

This combination of drop-off in affection and attention, which produces a non-adapted position in the family for the oldest child, coupled with confidence in symbolic skills, would seem to predispose the oldest child to intellectual accomplishment.

On the other hand, the oldest child is repeatedly found to be a conformist, a fact which is attributed to his unsatisfied dependency needs and to his social role as bearer of the family property and values (Kammeyer, 1966;[11] Rossi, 1965[12]).

Schachter (1959)[13] proferred the theory that the first-born person who gets dethroned by later born sibs will be anxious about losing his position and the love of his parents; he would thus be oriented towards seeking attention, approval, and support from others. Other studies lend credence to this position; in data from high school children of two-sibling families, first-borns manifested more achievement-related conformity than later-borns.[14] La Voie (1973) found

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[11]Kammeyer, K., "Birth Order and The Feminine Sex Role among College Women," American Sociological Review, v. 31, p. 508-515, August 1966.

[12]Rossi, Alice C., "Naming Children in Middle-Class Families," American Sociological Review, v. 30, p. 499-513, August 1965.

[13]Schachter, Stanley, op. cit.

[14]Adams, Bert, N., "Birth Order: A Critical Review," Sociometry, v. 35, p. 411-439, September 1972.

adolescent first- and early-borns to be less deviant than later-born subjects,[15] and in a similar study of ninety-six 6th grade children, first- and only-borns were more readily influenced than were later-borns.[16]

3. First-Borns and Tradition

Because of the greater parental involvement with them, the first-borns tend to be the bearers of tradition;[17] studies indicate this is particularly true of older girls. Kammeyer (1966) found that, in comparison with later-borns, first-born girls are more traditionally oriented toward the feminine role (and are more likely to agree with their parents about the feminine role), have more traditional beliefs about female personality traits, are more likely to choose marriage over graduation from college and to describe themselves as religious. His findings support the proposition that first-born children are "conservators of the traditional culture."[18] In studies of achievement, then, it is clearly of importance

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[15]La Voie, Joseph C., "Individual Differences in Resistance-to-Temptation Behavior in Adolescents: An Eypenck Analysis," Journal of Clinical Psychology, v. 29, p. 20-22, January 1973.

[16]Carrigan, W. C. and Julian, J. W., "Sex and Birth Order Differences in Conformity As A Function of Need-Affiliation Arousal," Journal of Personality and Social Psychology, v. 3, p. 479-483, April 1966.

[17]Lear, J., "Child: His Relation to His Time," Saturday Review, v. 51, p. 88, December 7, 1968.

[18]Kammeyer, K., op. cit.

to take into account what the family values are (Strodtbeck, 1958)[19] or to what extent the oldest child can achieve a more satisfying state of affairs through achievement by conformity.

While the major emphasis has been on early- and only-borns, later- and last-borns have also demonstrated significant differences from other groups of siblings. Folklore would have us believe that later sons are the ones most often the tradition-breakers and innovators. An historical list of some of the more eminent later born sons: Lenin, Benjamin Franklin, Nietzsche, Rousseau, and Thoreau, appears to lend credence to that legend.

4. Birth Order and Performance Under Stress

The apparent superiority of first- and only-borns in achieving academic and professional eminence stands in marked contrast to the evidence concerning performance under stress. Schachter found that under the stressful conditions of combat, first- and only-born fighter pilots were inferior in performance when judged on the criterion of "number of Migs shot down," whereas later borns were more likely to achieve "Ace" rankings as pilots (Korean War).[20] (This may correlate with Olson's (1973) finding that first-borns have

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[19] Strodtbeck, F. L., McClelland, D. C., and others, Talent and Society, p. 135-194, Princeton, 1958.

[20] Schachter, Stanley, op. cit.

greater concern for their physical health.)[21]

More recently, Helmreich and Radloff (1968) found that the performance of later-borns as divers in Project Sealab was significantly better than that of first- and only-borns.[22] Hence, first-borns are apparently not superior achievers in every field of endeavor.

5. Some Contradictions

Despite the large number of studies which examine differences between first- and only-borns and later-borns on a wide range of variables, much of the data appears inconsistent and contradictory.

As previously noted, Kammeyer (1966) concluded that first- and only-born females tend to be more conformist and parent-oriented.[23] Roodin and Vaught (1972) in contrast found no relationship between birth order and conservatism among fifty-two first- and only-born undergraduate females.[24] And Dale's study (1973) of high school students indicated that first-borns were more self-directive and less parent

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[21]Olson, Terence D., "Family Constellation As Related to Personality and Achievement," Ph.D. Dissertation, Florida State University, 1973, Dissertation Abstracts International, v. 33(10-B), p. 5000-5001, April 1973.

[22]Helmreich, Robert, "Birth Order Effects," Naval Research Review, p. 1-16, February 1968.

[23]Kammeyer, K., op. cit.

[24]Roodin, Paul A. and Vaught, Glen M., "Birth Order and Conservatism," Psychological Reports, v. 31, p. 814, December 1972.

oriented than later-borns,[25] which is also in direct contradiction to the earlier works.

6. Birth Order and Affiliation

Other studies have questioned the affiliation need of first- and only-borns. Testing of 1,023 Air Force Academy freshmen indicated no correlation between birth order and affiliation;[26] and Baker and O'Brien (1969) found that a significantly larger number of later-born persons affiliated with fraternities than did first- and only-borns.[27]

7. Birth Order and Anxiety

Still another example of the mounting contradictions in birth order studies is the existence of numerous discrepancies in works on birth order and anxiety. In one study of seventy-eight male college students, first-borns anticipated less anxiety towards reassuring materials than later-borns, and more anxiety towards anxiety-arousing materials than did

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[25]Dale, John H. Jr., "The Significance of Sibling Position and The Frequency of Participation by Adults in Group Counseling Activities," Ph.D. Dissertation, Florida State University, 1972, Dissertation Abstracts International, v. 33(8-A), p. 4041-4042, February 1973.

[26]Payne, David L., "Birth Order, Personality and Performance at The Air Force Academy," Journal of Individual Psychology, v. 27, p. 185-187, November 1971.

[27]Baker, Frank and O'Brien, Gregory M., "Birth Order and Fraternity Affiliation," Journal of Social Psychology, v. 78, p. 41-43, June 1969.

later-borns,[28] yet later-borns showed more attitude change than first-borns under high stress conditions at Naval Training Center, San Diego.[29] Jacoby (1968)[30] and Weller (1962),[31] contrary to Schachter,[32] found no differences in aroused anxiety by birth order even when experimental anxiety was taken into account.

8. Birth Order and Academic Achievement

While disagreement may reign supreme regarding the correlation between birth order and other variables, the fact that first- and only-borns are consistently pre-eminent in academic achievement remains unchallenged; why they are superior, however, still remains relatively mysterious.

Academic pre-eminence is not accounted for by intelligence alone. While high school first- and early-borns consistently score higher in National Merit Scholarship Qualification

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[28]Suedfield, Peter, "Sensory Deprivation Stress: Birth Order and Instructional Set As Interacting Variables," Journal of Personality and Social Psychology, v. 11, p. 70-74, January 1969.

[29]Helmreich, Robert; Kuiken, Doland; and Collins, Barry, "Effects of Stress and Birth Order on Attitude Change," Journal of Personality, v. 36, p. 466-473, September 1968.

[30]Jacoby, Jacob, "Birth Rank and Pre-Experimental Anxiety," Journal of Social Psychology, v. 76, p. 9-11, October 1968.

[31]Weller, Leonard, "The Relationship of Birth Order to Anxiety: A Replication of The Schachter Findings," Sociometry, v. 25, p. 415-417, December 1962.

[32]Schachter, Stanley, op. cit.

Tests,[33] intelligence testing of over 88,000 high school students showed that the mean difference between first- and last-borns was only 3.28 IQ points. (Middle-borns tended to be in-between.)[34] Such a small difference is unlikely to have any practical effects on the academic achievement of first-borns relative to later-borns.

Despite some evidence to the contrary, the difference between first- and later-borns in educational attainment may be best explained by the same dependency variable that accounts for most other findings related to ordinal position. Alexander (1968) suggests it can be explained by the first-born's greater sensitivity to and dependence upon the social evaluation of others.[35]

9. Birth Order and Some Other Key Variables

Much of the controversy surrounding birth-order effect may be experimentally induced; different tests for the same variables appear to give conflicting results; different populations, of different age groups, social levels, etc., appear to result in different findings. The fact that

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[33]Breland, Hunter M., "Birth Order and Intelligence," Ph.D. Dissertation, State University of New York at Buffalo, 1972, Dissertation Abstracts International, v. 33(4-A), p. 1536, October 1972.

[34]Burton, Dee, "Birth Order and Intelligence," Journal of Social Psychology, v. 76, p. 199-206, December 1968.

[35]Alexander, C. Norman Jr., "Ordinal Position and Social Mobility," Sociometry, v. 31, p. 285-292, September 1968.

sex distribution, family size, age space, and parental-sibling interactions were not represented in the earlier studies, particularly in the pioneer works of Altus (1965)[36] and Schachter (1963),[37] appears to have limited the generalization of their findings. In fact, many of the later studies have achieved excellent results by controlling for these factors in regard to ordinal position.

a. Family Size

Family size appears to have a bearing upon achievement. Solomon (1972) found that first-born subjects did best in small families, last-borns did best in intermediate size families (four to five children), and that there was no birth order differentiation in larger families.[38] Smart (1963) found that while later-borns are not over-represented among alcoholics, the number of alcoholics from large families is significantly larger than expected.[39] Much work remains to be done in this area, however, and the significant interactions of other variables should be investigated.

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[36]Altus, William D., op. cit.

[37]Schachter, Stanley, op. cit.

[38]Solomon, Daniel, and others, "Family Characteristics and Elementary School Achievement in An Urban Ghetto," Journal of Consulting and Clinical Psychology, v. 39, p. 462-466, December 1972.

[39]Smart, R. G., "Alcoholism, Birth Order, and Family Size," Journal of Abnormal and Social Psychology, v. 66, p. 17-23, January 1963.

b. Sibling Sex

Brim's re-analysis of Koch's data indicated that in a majority of traits the children with siblings of the opposite sex tended to differ from children with sibs of the same sex. Academic achievement was the one trait on which both first-born boys and girls with siblings of the opposite sex rated higher than first-borns with sibs of the same sex.[40] Helson (1968) also found that creative women and their brothers both gave evidence of productive achievement orientation, whereas the sisters of creative women did not.[41]

A more detailed analysis of factors contributing to the over-representation of first-borns in college populations is also afforded by examining sibling sex effects. Analysis of educational differences within two-child families by Alexander (1968) revealed that: (1) first-borns attain significantly more education than their last-born sibling only when the first- and last-born are of the opposite sex, and (2) there is an over-representation of the cross-sex, two-child family in three independent samples.[42] The widely

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[40]Brim, Orville G. Jr., "Family Structure and Sex Role Learning by Children: A Further Analysis of Helen Koch's Data," Sociometry, v. 21, p. 1-16, March 1956.

[41]Helson, Robert, "Effects of Sibling Characteristics and Parental Values on Creative Interest and Achievement," Journal of Personality, v. 36, p. 589-607, December 1968.

[42]Alexander, C. Norman Jr., op. cit.

reported over-representation of first-borns in college is thus a function not only of ordinal position, but also of sex of the subject and sex of the sibling.

c. Parental Influence

The effects of parental-orientation and conformity may be tied with ordinal position, sex of sibling, and family size. Alexander (1968) found that first-born girls from two- and three-child families were consistently more adult oriented than their later-born sibs.[43]

The complexity of such family inter-action patterns was demonstrated in a study of the effect of sibling sex on family member feminity (Fe) scores.[44] In girl-girl families studied, there was a positive correlation between the Fe scores of the females, while the father's score was uncorrelated and relatively isolated. In girl-boy families, on the other hand, the Fe scores of the boy, mother, and father all correlated positively, while the girl's Fe score did not. In addition, girls in the girl-boy families tended to have higher Fe scores than other members of the family, and they displayed a heightened identification with their mothers (in comparison with girls in the girl-girl families).

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[43] Alexander, C. Norman Jr., Ibid.

[44] Alexander, C. Norman Jr., Ibid.

d. Age Space

Age space also appears to directly affect later-borns. Breland (1972) found that closely following siblings tended to score lower on tests of academic achievement than did siblings with greater age space.[45] And Sterner (1973) reported that younger brothers of brothers (YBB) if close in age to their older brother consistently displayed negative and competitive interactions.[46]

10. Birth Order and Family Constellation

Perhaps the most exciting study of birth order and family constellation to date is Walter Toman's (1970) study of the constellation of over three thousand families.[47] By controlling for sibling sex, age space, parental-sibling interaction, family loss trauma, and sibling position of parents, Toman has been relatively successful in portraying consistent major attitudes, personality characteristics, choice of friends, philosophy, and likelihood of stability in marriage for individuals investigated.

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[45] Breland, Hunter M., op. cit.

[46] Sterner, Gary A., "Birth Order and Self-Esteem As A Determinant of Affiliation Behavior Under Ego-Threatening Conditions," Ph.D. Dissertation, Wayne State University, 1972, Dissertation Abstracts International, v. 33(11-B), p. 5501, May 1973.

[47] Toman, Walter, "Never Mind Your Horoscope, Birth Order Rules All," Psychology Today, v. 4, p. 45-49, 68-69, December 1970.

His analysis of marriage stability is of particular note. Of sixteen stable couples (married over ten years, at least two children), 75% were fully or partially complemented by sibling position,[48] while only one of sixteen (8.33%) of the marriages which ended in divorce was complementary by sibling position. Mendelsohn (1973) found that inter-personal skills were facilitated when young adults had had the opportunity as children to experience a variety of peer roles by interacting with others of different age and sex.[49] His findings partially confirm Toman's; the similarity of heterosexual pairing (in marriage and dating) to sibling configuration increased the possibility of a successful match. Sibling sex was found to be the variable most relevant to successful pairing, followed by birth order and complementarity of sibling sex.

11. Birth Order and Acculturation

Yadon (1971) also found a significant interaction between ordinal position, sex, and achievement; in addition, she found cultural differences in the social role of each

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[48]Good complementarity was defined as Older Brother of a Sister (OBS) paired with a Younger Sister of a Brother (YSB), or an Older Sister of a Brother (OSB) paired with a Younger Brother of a Sister (YBS).

[49]Mendelsohn, Mark B., "Successful Heterosexual Pairing, Sibling Configuration, and Social Expectancy," Ph.D. Dissertation, Purdue University, 1972, Dissertation Abstracts International, v. 33(9-B), p. 4521, March 1973.

sex.[50] She tested first-born males and females and their second-born siblings in three ethnic groups: Anglo (AN), Mexican-American (MA), and Black American (BA). First-born females in all three ethnic groups scored significantly higher on the academic achievement tests than did their siblings of either sex. In contrast, Younger Brothers of Brothers in the Anglo group scored significantly higher than their older brothers. Yadon's studies indicate that acculturation should be considered in future studies of birth order and achievement.

B. PURPOSE

Birth order appears to be an important factor in individual achievement. Studies indicate, however, that it is not birth order alone which affects personality, but that birth order functions in a complex interaction with several other variables within the individual's family constellation. These variables include, but are not limited to, sibling sex, age space, family size, parental-sibling interaction, and acculturation.

Most of the studies of birth order to date have resembled the three blind men examining the elephant. First, while the studies have examined one or more aspects of birth order,

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[50]Yadon, Yvonne H., "Birth Order and Achievement in Anglo, Mexican-American and Black Americans," Ph.D. Dissertation, University of Texas at Austin, 1971, Dissertation Abstracts International, v. 33(1-A), p. 190, July 1972.

they have failed to control for the large number of intervening variables which may significantly alter birth order effects. Secondly, they have failed to examine or control many factors in the external environment which may significantly affect individual achievement. Lastly, most of the studies have defined achievement in terms of academic success whereas it is essential to recognize that success in life may not always be directly correlated with academic success.

The purpose of this work is to study the effects of birth order on achievement in two dimensions: (1) academic achievement, as measured by Quality Point Rating, and (2) occupational achievement, as measured positively by early promotion and negatively by failure of on-time promotion.[51] To control for intervening variables and the external environment, forty-one separate biographical variables have been considered.

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[51]See APPENDIX A (Glossary) for more detailed definitions of independent variables.

II. METHODOLOGY

A. CONDUCT OF THE STUDY

1. General

The survey universe used for this study was a list of 1,168 U. S. officer students assigned to the Naval Postgraduate School as of February, 1974. The list, together with student mail center addresses, was obtained from the NPGS Data Processing Coordinator.

2. Instrumentation: A Description of the Questionnaire

A survey questionnaire was designed to acquire data regarding the three criteria dependent variables (QPR, early promotion, and pass over) and forty-one independent variables.[52]

All the questions asked for objective, factual information. There were no open-ended questions.

Demographic information was requested first. Questions one through five asked for age, family status, educational level, place of birth, and size of community where raised.

Biographical information addressing the time since the respondent had entered the military service was then requested. Questions six through fifteen asked for enlisted service time, commissioned service time, graduate school

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[52]See APPENDIX C which is the Questionnaire used in this study.

time, QPR, curriculum being studied, commission source, rank, designator, and early promotion and pass over history.

Questions sixteen and seventeen were simply indicators of intro-extroversion and conservatism. They were not directly related to the other data gathered.

Questions eighteen through twenty-six provided data on the respondents' sibling constellations and on sibling educational levels. These questions were thought to be of possible value because many of the studies previously referred to showed relationships between ordinal position, sex of the respondent, sex of the siblings, and the educational achievement levels of both.

Questions twenty-seven through thirty-one enabled the study to consider not only the respondent, but his total family as well. The socioeconomic information allowed this study to consider differences in these factors which many previous studies had neglected.

Questions thirty-two through thirty-four examined the respondent's first twelve years and inquired about deaths in the family, by whom the respondent was raised, and what his parents' marital status was when he was age twelve.

The remaining questions were used to provide the sibling constellation information pertaining to the respondent's wife.

3. Design of Data Collection

The questionnaire was distributed to the eligible respondents via their student mail center mailboxes. The

questionnaire provided a ready means of gathering data, permitted economy of time and expense, eliminated interviewer bias, permitted greater care by the individual in making his responses, and may have gained in validity through assurance of anonymity.

The limitations of a mailed questionnaire were recognized. Besides the risks of self-selection bias due largely to non-response, there were also limitations imposed by the inability to ensure that all questions would be completely understood and answered.

4. Pre-Testing The Questionnaire

To reduce as much as possible the harmful effects of these latter limitations, the questionnaire was pre-tested on a class of twelve students enrolled in a research methodology course at the Naval Postgraduate School. It was considered that such a group of students would be particularly sensitive to the problems inherent in a questionnaire, and, in fact, their comments resulted in several subtle, but important changes.

5. Precautions Taken To Ensure Response

The following steps were taken to help ensure a high response rate:

a. The cover sheet of the questionnaire[53] was purposely written to imply to the respondent that the study was

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[53]See APPENDIX B which is the cover sheet of the study's questionnaire.

of greater significance than a locally conducted student project. It also pledged anonymity to the respondent. And finally, it provided the respondent the opportunity of receiving a personal copy of the study's results.

b. The size of the questionnaire was kept to a minimum consistent with obtaining only the vital information needed for the study. Unessential questions were eliminated from rough-draft and pre-test questionnaires.

c. The time required to complete the questionnaire was no more than a few minutes. Three of the questions required one-word responses; the remainder were answered by using one to three digits or by circling the words "yes" or "no."

d. The questionnaire and its cover sheet were photo-offset printed on a pastel colored paper. The colored paper was intended to attract the potential respondent's attention and to make him more responsive.

e. To further promote a quasi-official aura to the study two other means were used:

(1) Unlike most student administered surveys which used makeshift pasteboard boxes to collect the completed questionnaires; a metal ballot box, of the type used in local county elections, was obtained and prominently located in the student mail center. To it was affixed a large phenolic label stating "SELECTION RESEARCH."

(2) The mailbox number on each respondent's questionnaire was machine stamped vice handwritten on the back page.

6. Response Results

The questionnaires were distributed via the student mail center mailboxes on 28 February and the returns were discontinued on 29 March, a total period of approximately four weeks.

In all, 630 returns were received from the 1,168 eligible respondents in the survey universe -- a 53.9% return. All respondents who were not in the naval community or in a curriculum leading to a Master's Degree were subsequently removed from the sample. The resulting sample size for this study was 463.

7. Coding Of The Questionnaire

When the questionnaires had been completed and returned, it was necessary to numerically code those questions which required a written response[54] and then to list the numerical responses for all questions in the column on the questionnaire labelled "for office use only." This step permitted facile transference of the responses from the questionnaires to the keypunch coding worksheets.

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[54]See APPENDIX D which contains the tables used in coding questionnaire responses.

8. Data Verification

These keypunch coding worksheets were used by the Naval Postgraduate School computer center keypunch operators in preparing the data deck for the study. The data for each respondent was punched on a separate IBM computer card. Of the eighty available columns on the card, seventy-nine were used.

The completed data deck was verified by two separate processes:

a. Each data card was manually-visually compared, column by column, to the appropriate coding worksheet. Errors detected in this manner were then corrected.

b. A computer printout of the entire data deck was then obtained. A table listing the acceptable values for each column of the data card was prepared. With this table of values as a reference, it was possible to manually-visually check each column of the data deck listing and to thus identify and correct any aberrant values.

This double verifying of the data provided the certitude of having a reasonably "clean" data deck with which to begin the study's computer analyses.

B. DESCRIPTION OF THE SAMPLE

1. General

As mentioned above, the sample was composed of 463 naval officers enrolled at the Naval Postgraduate School in a course of instruction leading to a Master's Degree. The

average age of the respondent was 30.9 years and his mean education was 17.4 years. The average years of commissioned service was 8.1, and 24.8% (115) of the respondents had one or more years of enlisted service. There were thirty-one early promotions (6.7%) and nine pass-overs (1.9%), and the average QPR was 3.36.

2. Family Background[55]

The average number of children in the respondent's family was 3.2 and the mean family income was $ 7,920. The group's father's and mother's educational level was 12.9 and 12.7 years, respectively, and the average subject was born when his mother was 26.9 years old.

3. Current Family Status

Fifty-four per cent (N = 250) of the sample were married with a youngest child under six years of age, while 16.8% (N = 78) of the sample had a youngest child between the ages of six and twelve years. Only 9.9% (N = 46) were married and without children.

Bachelors under thirty years of age accounted for 5.6% (N = 26) of the sample, while only 4.8% (N = 22) of the group were single and over thirty.

In the smallest family groups (1.5%, N = 7), the youngest child was a teenager (age thirteen to eighteen).

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[55]Statistics in this section refer to the subject's family during the period from his birth to when he was twelve years old.

4. Birth Order

The following is a breakdown of the group by order of birth:[56]

	(N=)	%
Only-Born (OB)	38	8.3
Older Brothers of Brothers (OBB)	125	27.2
Older Brothers of Sisters (OBS)	97	21.1
Middle Born (MB)	103	22.4
Younger Brothers of Brothers (YBB)	54	11.8
Younger Brothers of Sisters (YBS)	42	9.2
Total	459	100

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[56]For the purposes of this study, the working definitions assigned to the various birth order groups are as follows:

OB -- subjects had no sibs.
OBB -- subjects had one or more younger sibs, and their next younger sib was a brother.
OBS -- subjects had one or more younger sibs, and their next younger sib was a sister.
MB -- subjects had one or more younger sibs and one or more older sibs.
YBB -- subjects had one or more older sibs, and their next older sib was a brother.
YBS -- subjects had one or more older sibs, and their next older sib was a sister.

5. Designator

The following is a breakdown of the group by major officer designators:

Designator Number[57]	(N=)	%
1100 (line officer)	20	4.3
1110 (surface line officer)	146	31.5
1120 (submarine line officer)	38	8.2
1310 (aviation pilot)	97	21.0
1320 (aviation flight officer)	38	8.2
3100 (Supply Corps officer)	37	8.0
Other	87	18.8
Total	463	100

6. Source of Commission

The following is a breakdown of the sample by source of commission:

Commission Source	(N=)	%
Service Academy	138	29.8
Officer Candidate School (OCS)	126	27.2
Reserve Officer Training Corps (ROTC)	93	20.1
Aviation Officer Candidate (AOC)	44	9.5
Naval Aviation Cadet (NAVCAD)	20	4.3
Reserve Officer Candidate (ROC)	16	3.5
Integration Officer Program	12	2.6
Other	14	3.0
Total	463	100

[57] For a complete description of officer designators, refer to APPENDIX D, TABLE III.

7. Rank

The following is a breakdown of the sample by rank:

Rank	(N=)	%
Commander (O-5)	15	3.2
Lieutenant Commander (O-4)	143	31.0
Lieutenant (O-3)	272	58.7
Lieutenant, junior grade (O-2)	19	4.1
Ensign (O-1)	14	3.0
Total	463	100

C. COMPUTER ANALYSIS

1. Pearson's Correlation[58]

The subjects were grouped by birth order, designator, source of commission, rank, and years of commissioned service. Those groups containing ninety-five or more subjects were randomly split into subgroups containing 75% and 25% of the original groups. (The 25% subgroups were set aside for cross-validation.) Standard Pearson product-moment correlations were then computed between the dependent and independent variables for each subgroup (excluding the 25% subgroups) to determine the strength of bivariate association.

2. Multiple-Regression Analysis

Using those dependent-independent variable combinations which demonstrated significant ($r=20$, $p<.05$) bivariate

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[58]Pearson's Bivariate Correlation Analysis -- a subprogram of the Statistical Package for Social Sciences (SPSS) was utilized.

correlations, multiple-regression analysis was then performed on each 75% subgroup. This enabled accounting for the interrelationships among the independent variables while subjecting the linear relationships between the dependent and independent variables to more rigorous analytical scrutiny.

The regression equations producing the significant ($p<.05$) multiple correlations (which resulted from the multiple-regression analysis of the 75% subgroups) were then used to predict the dependent variables within the 25% subgroups.

Those groups which contained less than ninety-five individuals were then subjected to Pearson correlation and multiple-regression analysis for possible use in future studies.[59]

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[59]See APPENDIXES F and G.

III. FINDINGS

Pearson correlation analysis for the total sample (N=463) and its 75% subgroup (N=347) produced no significant correlations between birth order and achievement. The following is a list of the findings which resulted from the analysis of the other subgroups ($N \geq 95$).

A. RANK

A significant cross-validation between predicted and actual values of the two dependent variables, QPR and Passover, was attained for the following group: Navy Lieutenants with seven or more years of commissioned service and no enlisted service (N=97). The regression equations generated by the multiple-regression analysis of the 75% group are as follows:

Calculated QPR = 4.695 - .86 X (Under 30, single) + .25 X (ROTC graduate) - .22 X (Middle child) - .499 X (Divorced, remarried) - .34 X (Early promotion) - .038 X (Years education) + .107 X (Married, youngest child under six) - .025 X (Age)

Calculated Passover = .012 + .875 X (NAVCAD) + .24 X (Divorced, remarried) + .113 X (YBS)

Cross-validation of the 25% subgroup[60] yielded a correlation of r = .4263 (N=23, $p<.05$) between predicted and actual

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[60] See APPENDIX E, FIGURE 1.

QPR, and a correlation of r = .6566 (N=24, p<.001) between predicted and actual incidence of Passover.

B. BIRTH ORDER

1. Only-Born (OB)

a. Quality Point Rating (QPR)

The QPR of Only-Borns was affected positively by absence of death in the family in the early years (birth to twelve years old) and by being married, under thirty, with the youngest child under six. QPR correlated negatively with mother's educational level in years, with parental family income, with being divorced and remarried, and with being married, over thirty, and having no children. (See TABLE I, below.)

Group: ONLY-BORN (OB, N=35)

Analysis: Pearson Correlation

	Independent Variables		
Dependent Variable QPR	Married, under thirty, yngst child under six	No death in family	Married, over thirty, no children
Simple r	.63	.36	- .47
Signif.	p<.001	p<.05	p<.005
	Independent Variables		
Dependent Variable QPR	Family income	Mother's Educational level	Divorced, remarried
Simple r	(N=28) - .33	- .30	- .42
Signif.	p<.05	p<.05	p<.01

TABLE I

b. Early Promotion

The only variable which correlated with early promotion for Only-Borns was marriage to a middle-born wife. (See TABLE II below.)

Group: ONLY-BORN (OB, N=35)

Analysis: Pearson Correlation

Dependent Variable	Independent Variable
Early Promotion	Middle-born wife
Simple r	.35
Signif.	$p<.05$

TABLE II

c. Passover

The frequency with which Only-Borns were passed over increased with an increase in the age at marriage; with being married to an only-born wife; or with having been commissioned through ROTC. As Only-Born's father's occupational level increased, however, the incidence of being passed over decreased. (See TABLE III below.)

Group: ONLY-BORN (OB, N=35)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables			
Passover	Age at marriage	Only-born wife	ROTC graduate	Father's occupational level
Simple r	.65	.48	.32	- .35
Signif.	p<.001	p<.001	p<.05	p<.05

TABLE III

Being an Only-Born in the 1320 designator group (Aviation Flight Officers) correlated significantly (r=1.00, p<.001, N=38) with being passed over;[61] as did being an Only-Born in the Lieutenant Commander group (r=.231, p<.01, N=103).[62]

2. Older Brothers of Brothers (OBB)

a. Quality Point Rating (QPR)

Unlike any of the other family constellation groups, the QPR of OBB's correlated negatively with the size of the community in which an officer had been brought up.

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[61] See APPENDIX F, TABLE V.

[62] See APPENDIX E, TABLE I.

OBB's QPR also decreased with an increase in the size of parental family and with the occurrence of an early promotion. (See TABLE IV below.)[63]

Group: OLDER BROTHERS OF BROTHERS (OBB, N=109)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables		
QPR	Community size	Early promotion	Family size
Simple r	- .20	- .195	- .159
Signif.	p<.05	p<.05	p<.05

TABLE IV

b. Early Promotion

The incidence of early promotions for OBB's correlated positively with an early marriage, separated parents,[64] the size of his home town community,[65] and graduation from a service academy. (See TABLE V below.)[66]

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[63] See APPENDIX G, TABLE I.

[64] Refers to the period from birth to age twelve.

[65] Ibid.

[66] See also APPENDIX G, TABLE III.

Group: OLDER BROTHERS OF BROTHERS (OBB, N=109)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables				
Early Promotion	Age subject married	Separated parents	Community size	ROTC graduate	Service academy
Simple r	.22	.21	.21	- .15	.17
Signif.	p<.05	p<.01	p<.01	p<.05	p<.05

TABLE V

c. Passover

OBB's incidence of Passover was increased by his years of enlisted service, his family size, and by being married to a first-born wife. The incidence of Passover decreased with increases in his mother's educational level, and with a decrease in his wife's age at marriage. (See TABLE VI below.)[67]

[67] See also APPENDIX G, TABLE II.

Group: OLDER BROTHERS OF BROTHERS (OBB, N=109)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables				
PASSOVER	Years enlisted service	Family size	First-born wife	Mother's education level	Wife's age at marriage
Simple r	.43	.24	.17	- .22	- .18
Signif.	p<.005	p<.005	p<.05	p<.01	p<.05

TABLE VI

3. Older Brothers of Sisters (OBS)

a. Quality Point Rating (QPR)

Older Brothers of Sisters' QPR increased with being commissioned through ROTC, by marriage to a first-born wife, and with higher parental family income levels. OBS's QPR decreased with marriage to a last-born wife. (See TABLE VII below.) Being an OBS in the 1100 designator group (Surface Line Officer) correlated highly with QPR (r=.583, p<.005, N=20);[68] as it did within the Lieutenants without enlisted service group (r=.141, p<.05, N=206).[69]

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[68]See APPENDIX F, TABLE I.

[69]See APPENDIX E, TABLE II.

Group: OLDER BROTHERS OF SISTERS (OBS, N=97)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables			
QPR	ROTC graduate	First-born wife	Family income	Last-born wife
Simple r	.27	.27	.198	- .33
Signif.	p<.005	p<.005	p<.05	p<.001

TABLE VII

b. Early Promotion

OBS's incidence of early promotion increased with no deaths in the early family years, and decreased with increases in the father's education level. (See TABLE VIII below.)[70]

Group: OLDER BROTHERS OF SISTERS (OBS, N=97)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables	
Early Promotion	No deaths in family	Father's education level in years
Simple r	.295	- .17
Signif.	p<.005	p<.05

TABLE VIII

[70]See also APPENDIX G, TABLE IV.

OBS's fared well in the 1120 designator group (Submarine Line Officer); being an OBS correlated significantly with the success variable of Early Promotion. (See TABLE IX below.)

Group: 1120 DESIGNATOR (Submarine Line, N=38)

Analysis: Pearson Correlation

Dependent Variable	Independent Variable
Early Promotion	OBS
Simple r	.422
Signif.	p<.005

TABLE IX

c. Passover

Passover incidence for OBS's was greater with participation in the NAVCAD program, with a divorced-remarried marital status, and with marriage to a last-born wife. (See TABLE X below.)

Group: OLDER BROTHERS OF SISTERS (OBS, N=97)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables		
Passover	NAVCAD	Divorced-remarried	Last-born wife
Simple r	.49	.39	.27
Signif.	p<.001	p<.001	p<.005

TABLE X

4. Middle-Born Children (MB)

a. Quality Point Rating (QPR)

For those Middle-Borns experiencing maternal death during their early years (birth to twelve years of age), QPR increased with an increase in the number of years which they spent with their mothers. Middle-Born QPR also increased significantly with ROTC training and with marriage to a middle-born wife. (See TABLE XI below.) The fact that

Group: MIDDLE-BORN (MB, N=103)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables		
QPR	Years spent with mother before her death	ROTC graduate	Middle-born wife
Simple r	(N=6) .86	.27	.19
Signif.	p<.05	p<.005	p<.05

TABLE XI

an individual was a Middle-Born accounted for 4.6% of the variance in the regression equation for calculating the QPR of Navy Lieutenants with seven or more years commissioned service.[71] The fact that the Beta weight was negative

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[71]See APPENDIX E, TABLE IV.

(Beta = -.188) indicates that Middle-Borns tend to make lower grades than individuals in other sibling positions.

b. Early Promotion

MB's incidence of early promotion increased with an increase in the number of his wife's elder sibs. Like OBB's, MB's chances for early promotion appeared enhanced by graduation from a service academy. Participation in the Officer Integration program and married life also correlated highly with increases in early promotion. ROTC attendance correlated negatively with MB incidence for early promotion. (See TABLE XII below.)

Group: MIDDLE-BORN (MB, N=103)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables				
Early Promotion	No. of wife's elder sibs	Officer Integration program	Service academy graduate	Married	ROTC graduate
Simple r	(N=40) .30	.25	.19	.16	- .17
Signif.	p<.05	p<.005	p<.05	p<.05	p<.05

TABLE XII

c. Passover

The incidence of Passover for MB, like OBS, increased with participation in the NAVCAD Program; the current family status of being married, with the youngest

child between six and twelve years of age, also correlated positively with Passover. (See TABLE XIII below.)

Group: MIDDLE-BORN (MB, N=103)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables	
Passover	NAVCAD	Married, youngest child six to twelve years old
Simple r	.34	.28
Signif.	p<.001	p<.005

TABLE XIII

5. Younger Brothers of Brothers (YBB)

a. Quality Point Rating (QPR)

YBB's QPR increased with an increase in the number of his wife's elder sibs and decreased with his attendance at a service academy. (See TABLE XIV below.) Within the 1120 designator group (Submarine Line, N=38), being a YBB accounted for 5.1% of the variance in QPR (r^2=.051, B=-.244).[72] And in the analysis of the 1310 designator group (Aviation Pilot, N=33) in the Baccalaureate Program, being a YBB also correlated negatively with QPR.[73]

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[72]See APPENDIX F, TABLE III.

[73]See APPENDIX F, TABLE IV.

Group: YOUNGER BROTHERS OF BROTHERS (YBB, N=54)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables	
QPR	No. of wife's elder sibs	Service academy graduate
Simple r	(N=23) .36	- .33
Signif.	p<.05	p<.05

TABLE XIV

b. Early Promotion

Like the MB's, early promotion of YBB's increased with an increase in the number of the subject's wife's elder sibs and with the occurrence of divorced parents. (See TABLE XV below.)

Group: YOUNGER BROTHERS OF BROTHERS (YBB, N=54)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables	
Early Promotion	No. of wife's elder sibs	Divorced parents
Simple r	(N=27) .80	.38
Signif.	p<.001	p<.005

TABLE XV

c. Passover

There were no Passovers within the YBB group.

6. Younger Brothers of Sisters (YBS)

a. Quality Point Rating (QPR)

YBS's QPR increased with the age of his mother at birth and with a current family status of being married, youngest child between six and twelve years of age. Additionally, like YBB, the number of the wife's elder sibs correlated positively with QPR. For young (under thirty) YBS's, being single correlated negatively with QPR, as did being married with a youngest child under age six. (See TABLE XVI below.)

Group: YOUNGER BROTHERS OF SISTERS (YBS, N=42)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables				
QPR	No. of wife's elder sibs	Mother's age at subject's birth	Married, youngest child six to twelve yrs.	Single, under thirty	Married, under thirty, youngest child under six yrs.
Simple r	(N=18) .68	.47	.32	- .40	- .26
Signif.	p<.001	p<.001	p<.05	p<.005	p<.05

TABLE XVI

b. Early Promotion

As the years between the age of a YBS and his older sister increased, the incidence of early promotion increased. Officer Candidate School (OCS) training also correlated positively with the incidence of YBS early promotion. Father's and mother's education level showed significantly negative correlation with the incidence of early promotion for YBS's. (See TABLE XVII below.)

Group: YOUNGER BROTHERS OF SISTERS (YBS, N=42)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables			
Early Promotion	Years between subject and older sister	OCS graduate	Mother's education level	Father's education level
Simple r	.34	.27	- .52	- .42
Signif.	p<.05	p<.05	p<.001	p<.005

TABLE XVII

c. Passover

YBS's incidence of Passover increased with a divorced or single, over-thirty status but decreased with a married status. (See TABLE XVIII below.) Among the 1110 designator group (Surface Line), being a YBS correlated

positively with Passover ($r = .184$, $p<.05$, $N = 139$),[74] as it did within the Lieutenants without enlisted service ($r = .214$, $p<.001$, $N = 206$).[75]

Group: YOUNGER BROTHERS OF SISTERS (YBS, N=42)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables		
Passover	Unmarried, over thirty	Divorced	Married
Simple r	.55	.48	- .46
Signif.	p<.001	p<.001	p<.001

TABLE XVIII

[74] See APPENDIX F, TABLE II.

[75] See APPENDIX E, TABLE III.

IV. DISCUSSION

A. GENERAL

The lack of any significant correlations between birth order and achievement for the sample as a whole (N=463) was perhaps the most significant finding of this study. While there are numerous differences between this sample and those of earlier studies which may account for the contradiction in findings, no variable or combination of variables adequately explains why birth order does not appear to be related to the achievement of the group as a whole.

Within individual subgroups, on the other hand, birth order does appear to correlate with academic and/or occupational achievement. Although the large number of correlations computed (546) indicates that the findings, by themselves, might be due solely to chance, the common pattern of correlations within several of the subgroups indicates that birth order may affect the achievement of groups of individuals in a complex interaction with other variables.

B. BIRTH ORDER EFFECTS

1. Academic Achievement

The findings suggest that a general relationship exists between birth order and achievement such that

Middle-Borns achieve less well than individuals in other birth-order positions.[76] The findings also suggest that the effects of birth order on academic achievement are not of as great a magnitude as some other variables, including acculturation, family constellation, and current marital status.

The lack of academic excellence among middle-born offspring may be related to the lesser amount of parental attention received by MB's in contrast with other birth-order groups. This hypothesis is at least partially confirmed by the finding[77] that the academic achievement of MB's increases with an increase in the number of years during which offspring were reared by their mothers before her death.[78]

By way of contrast, the finding that there may be no significant differences between the academic achievement of first-, only-, and last-born children may be related to the greater amount of parental attention received by those offspring in comparison with middle-born children. Hilton (1967)[79] and Rothbart (1971)[80] found that first- and only-borns

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[76]See APPENDIX E, TABLE IV.

[77]See CHAPTER III, TABLE XI, p. 49.

[78]Refers to the period from the subject's birth to age twelve.

[79]Hilton, Irma, op. cit.

[80]Rothbart, Mary K., op. cit.

receive more parental attention than later-born sibs. It may well be that the last-born child in the American culture also receives more attention from parents and older sibs than do MB's, as a result of being the "baby" of the family. The findings, though inconclusive in this regard, do indicate that parental attention may be one of the factors responsible for the decreased academic achievement of middle-born offspring in comparison with first-, last-, and only-borns.

2. Occupational Achievement

Although no single birth order configuration appeared to excel in occupational achievement, Younger Brothers of Sisters seemed to perform less well in that regard. This finding may partially substantiate Toman's (1970)[81] clinical observation that YBS's are not popular among their male peers. The finding that YBS's occupational achievement appears to improve with increases in the number of years between themselves and their older sisters (YBB's showed no similar tendency) suggests that decreased age-space may increase a YBS's identification with his older sister. This increased identification with an older, opposite-sexed sib, may in turn lead to less facile relationships by YBS's with their all-male superiors, subordinates, and peers in the naval milieu.

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[81]Toman, Walter, op. cit.

C. FAMILY CONSTELLATION EFFECTS

1. Family Size

This study partially substantiates Solomon's (1972)[82] findings that first-borns do best in small families. Increased family size of Older Brothers of Brothers appears to be associated with decreased academic and occupational achievement.

The finding that Older Brothers of Sisters were not similarly affected partially substantiates Brim's (1956)[83] findings that the traits of children with siblings of the opposite sex tended to differ from those of children with sibs of the same sex.

The findings do not indicate precisely why increasing family size might be detrimental to OBB's achievement; further research is necessary in this matter.

2. Parental Influence

a. Parent's Education Level

(1) Academic Achievement

The findings suggest that an increase in the educational level of mothers may negatively affect the academic achievement of only-born children.[84] It is possible

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[82]Solomon, Daniel, and others, op. cit.

[83]Brim, Orville G. Jr., op. cit.

[84]This finding does appear to support the previously proferred hypothesis regarding the academic achievement of middle-born offspring, i.e. that MB's decreased academic achievement results from a decreased amount of parental attention.

that those mothers with a great deal of education may in fact spend more time away from home in pursuit of a career or avocation, and thus give less of their time and attention to their only-born offspring. The resultant loss of attention for the parent-oriented OB's may in turn lead to a reduced identification with the mother, and a reduced need to achieve.

The relatively lower significance level ($p<.05$) of the correlation leaves the findings somewhat in question. However, the finding that mother's educational level showed no significant relationship to academic achievement in the other family constellation groups is in direct contrast with earlier studies by Hutner (1972)[85] and Dizdarevic (1973).[86] The findings do suggest that the academic achievement of relatively older, all-male subjects may not be affected by parental education as significantly as younger, heterosexual groups of school children; unfortunately, the findings do not suggest precisely why.

(2) Occupational Achievement

The findings suggest that an increase in the educational level of mothers correlated positively with

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[85]Hutner, Frances C., "Mother's Education and Working: Effect on The School Child," Ph.D. Dissertation, Purdue University, 1972, Dissertation Abstracts International, v. 33(10-A), p. 5569, April 1973.

[86]Dizdarevic, Ismet, "Effect of Economic Standard and Educational Level of Parents on Childrens' Scholastic Achievement," Psiholoske razprave, IV Kongres psihologov SERJ, as reported by Psychological Abstracts, v. 51, February 1974.

the occupational achievement of OBB's and negatively with the occupational achievement of YBS's. The occupational achievement of both YBS's and OBS's correlated negatively with an increase in the educational level of their fathers. The contradiction of these findings may in fact partially substantiate Toman's (1970)[87] observation that sibling sex appears to affect the way individuals learn to relate to others. With less attention from their better-educated parents, individuals may increase their affiliation and identification with their next younger or next older sib. For OBB's, greater identification with a younger brother might in turn enable them to perform more effectively in an essentially all-male organization such as the U. S. Navy.

For OBS's and YBS's, on the other hand, greater identification with their next older or next younger sister might lead to less facile relationships with their all-male superiors, subordinates, and peers.

It may be that the contradictions between this study and earlier works (regarding achievement and parental educational level) are the result of a non-linear relationship between parents' educational level and occupational achievement. Unfortunately, substantiation of this hypothesis is beyond the scope of this study.

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[87] Toman, Walter, op. cit.

b. Father's Occupational Level

The finding that an only-born offspring's occupational achievement was enhanced by higher occupational level on the part of his father appears to substantiate Toman's (1970)[88] clinical observation that only-borns may have a greater parental identification than other birth-order groups. This parental identification may, in turn, account for an OB's decreased academic achievement with decreased attention from his better educated mother. The findings are inconclusive in this regard but do indicate that the apparent greater parental identification of only-born offspring deserves additional study.

3. Mother's Age at Subject's Birth

YBS's academic achievement, in contrast with other birth order groups, was linked with mother's age at the time of the offspring's birth. This may be related to factors of culture and attention. Since there was no similar finding for YBB's, it may be that the birth of a YBS to an older mother represents the long-awaited arrival of a male heir to carry the family name. Such a scenario might elicit more parental attention and concern for these YBS's than for YBB's and YBS's born to younger mothers. Again, the findings are inconclusive in this regard, but they do suggest that the

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[88] Toman, Walter, Ibid.

occupational achievement of last-born offspring with opposite-sexed older sibs may be enhanced by lesser educated parents; and that YBS's academic achievement may be enhanced by birth to an older mother.

4. Age Space

Aside from the positive correlation between age space and occupational achievement for Last-Borns, as previously mentioned, there were no significant correlations among birth order, age space, and achievement.

5. Family Trauma

a. Parental Death and Achievement

(1) Only-Borns (OB)

For OB's the loss of a parent or parents results in less parental attention and approval for achievement during OB's childhood years. This early lack of incentive for achievement may well lead to a reduced need for academic achievement during OB's later years.

(2) Older Brothers of Sisters (OBS)

The loss of a parent appears to affect OBS's occupational achievement in a manner similar to that of YBS's with better educated parents:[89] a frustration of the need for parental attention and identification. Unlike OB's, who have no younger sibs, OBS's thus frustrated may increase their identification with their younger sisters. This sibling

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[89] See Section C.2.a, this chapter.

identification may in turn lead to less facile relationships and identification with same-sexed superiors, subordinates, and peers in the military service, which would account for decreased occupational achievement.

b. Parent's Marital Status (at Subject's Age of Twelve)

The occupational achievement of both OBB's and YBB's appeared to be enhanced by the occurrence of parental separation or divorce.[90] This unexpected finding again seems to indicate a heightened sibling-identification, versus parental-identification, on the part of sibs whose need for parental attention and identification has been frustrated. The interaction of sibling sex and occupational achievement here becomes clearer. Whereas the apparent increased sibling-identification of OBS/YBS's tended to decrease their occupational-achievement levels in a same-sex occupation (such as the military), the increased same-sex sibling-identification of OBB/YBB's appeared to enhance their occupational achievement in the Navy.

The lack of significant numbers of divorced or separated parents may account for a lack of similar findings for OBS/YBS's. On the other hand, it may be that OBS/YBS subjects, who have suffered family trauma, identify so strongly with their sisters that they may avoid military service

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[90]See Chapter III, TABLES V and XV.

altogether; the findings do not strongly suggest any precise reason for the absence of any correlations between OBS/YBS achievement and family trauma.

6. Community Size

OBB occupational achievement increased and academic achievement decreased with an increase in the size of home town communities. The relatively lower significance level ($p<.05$) of these findings, coupled with a total lack of correlation among other family constellations, indicates that this finding for OBB's may be due to chance, and that community size may be unrelated to achievement.

D. ACCULTURATION EFFECTS[91]

1. Birth Order Groups

The findings regarding acculturation within individual birth order groups were inconclusive. Commissioning via ROTC correlated positively with academic achievement for Older Brothers of Sisters and Middle-Borns, and it tended to have a negative correlation with the occupational achievement of the first-, only-, and middle-born family constellations. A service-academy commission appeared to have the opposite effect; both OBB and MB occupational achievement correlated positively with service-academy graduation, while the same variable related negatively with the academic achievement of YBB's.

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[91] Acculturation is here defined as the source of training, and its effects, which led to the individual's commissioning as an officer.

Naval Aviation Cadet training appeared to have a negative relationship with the occupational achievement of both OBS's and MB's, but no relationship was found within the other birth-order groups.

While the findings are relatively consistent, they do not readily explain the reasons for such inconclusive results regarding either the interaction of acculturation and birth order or the effects of the two variables on achievement.

2. Rank Subgroups

The effects of birth order and acculturation within other subgroups were also conflicting and inconclusive. For example, the effects of birth order on academic achievement of the Lieutenant subgroups appeared to be less than the effect of acculturation, and yet just the opposite was found for Lieutenant Commanders. One possible explanation for this inconsistency is that some of those individuals negatively affected by acculturation effects may have been previously attrited, or not selected for postgraduate training. Unfortunately, the findings do not suggest any plausible explanation for the apparent discrepancy.

3. Designator Subgroups

The achievement of most individual designator subgroups did not reflect any acculturation effects. The two exceptions, 1120 and 1320 designators, seemed affected less by acculturation than by birth order. The findings regarding birth order and acculturation are inconclusive for these subgroups.

E. MARITAL STATUS EFFECTS

1. Birth Order Groups

Marital status did not appear to affect the achievement within all birth-order groups, and the findings were inconsistent. Being currently married correlated positively with the achievement of OB's, OBB's, MB's, OBS's, and YBS's. Only for YBB's was there no correlation. The findings that both academic and occupational achievement appear to be affected in the same manner by current marital status is significant; it appears that being married may positively affect the achievement of naval officers.

2. Rank Subgroups

The marital status of both Lieutenant Commanders and Lieutenants appeared to have more effect on achievement than did birth order. Being married correlated positively with achievement with one exception: Married Lieutenant Commanders over thirty years of age, who had no children, tended to have lower occupational achievement than their counterparts.

3. Designator Subgroups

The marital status of subjects within individual designator subgroups either had no apparent effect on achievement or it affected achievement less than birth order.

Hence, within the 1120 and 1320 designator subgroups, birth order appeared to affect achievement more than current individual marital status. Only the data for the 1110 designator subgroup indicated that individual marital status might

affect achievement more than birth order. The low significance level ($p<.05$), however, leads one to question the importance of this particular finding.

In all designator subgroups being married correlated positively with achievement.

F. EFFECT OF WIFE'S FAMILY CONSTELLATION

1. Birth Order Groups

The findings suggest that partial rank- or sex-conflict[92] with the wife's family constellation correlates positively with achievement within some birth order groups. Hence, marriage to a middle-born wife correlated positively with the academic achievement of MB's, as well as with the occupational achievement of OBS's. OBS's academic achievement also correlated positively with marriage to a first-born wife.

On the other hand, achievement within one birth-order group correlated negatively with marriage to a spouse with full rank- and sex-conflict:[93] Marriage of an OB to an only-born wife correlated negatively with occupational achievement.

The findings were neither all-inconclusive nor completely consistent, however: Academic achievement correlated

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[92]By Toman's definition, partial rank- or sex-conflict applies to spouses who were either matched by birth order or had a sibling of the opposite sex, but not both.

[93]By Toman's definition, full rank- and sex-conflict indicates totally mismatched couples, e.g., both birth order and sibling sex were in conflict (as would be the case for an OBB with an only-born wife).

negatively with marriage to a last-born wife for OBS's, as well as to a first-born wife for OBB's. The number of the wife's elder sibs, moreover, correlated positively with the achievement of all later-born subjects (i.e., MB, YBB, YBS); yet not significantly with the achievement of first- or only-borns.

The apparent inconsistencies of the findings indicate that some factors other than the wife's family constellation (e.g., the family constellation of each spouse's parents) may be responsible for a large share of the achievement results.

2. Other Subgroups

Within individual subgroups, the only birth order of the subject's wife which appeared significant is that of the only-born wife. The findings, however, are inconsistent. For both 1120 and 1320 designator groups, marriage to an only-born wife appeared to negatively affect achievement, whereas marriage to an only-born wife appeared to positively affect the achievement of 1100 designator subjects. Within the rank groups studied, there were no correlations between achievement and the family constellations of subjects' wives. While the significance level of the findings may indicate that they are not due to chance, the inconsistencies suggest that other variables not included in this study may be partially responsible for the calculated correlations.

V. CONCLUSIONS

A. GENERAL

While the significance of many of the findings is open to question, several patterns that persistently appeared deserve greater scrutiny.

1. Multiple-Regression Equations

The multiple-regression equations produced by the SPSS multiple-regression analysis may well reflect a great deal of sample bias, and though the findings do not indicate any validity outside of the Naval Postgraduate School environment, they do suggest that future studies of achievement should attempt to determine multiple-regression equations using the apparently significant variables uncovered in this study together with an additional measure of the subject's intelligence, to identify over- and under-achievers.

2. Academic vs. Occupational Achievement

The findings appear to indicate that academic and occupational achievement do not always correlate and may in fact be related in a more complex manner than is readily explained here. Perhaps, more than even these two success criteria should be used to further understanding in future studies.

B. BIRTH ORDER AND ACADEMIC ACHIEVEMENT

The findings fail to support the results of previous studies which indicate a pre-eminence of first- and only-born

offspring in the area of academic and occupational achievement. Instead, this study indicates that the academic and occupational achievement of only-, first-, and last-born offspring is relatively similar. The occupational achievement of middle-borns is similar to other family constellation groups, but their academic success is apparently not so high.

These findings also indicate that future studies of birth order and academic achievement should include a variable or variables which measure intelligence (e.g., IQ tests, Graduate Record Exam scores, etc.) to identify over- and under-achievers.

C. PARENTAL INFLUENCE, SIBLING SEX, AND AGE SPACE

The findings indicate that parental influence, sibling sex (e.g., whether the subject had a brother or a sister), and age space (years between the subject and his next-older or next-younger sib) appear to affect achievement in a very complex manner.

On the other hand, the findings also indicate that last-born children tend to attain greater occupational achievement in fields predominated by co-workers of the same sex as their older sibs but lower occupational achievement in fields predominated by co-workers of the opposite sex of their older sibs, especially under conditions of reduced age space.

Occupational and academic achievement of first- and only-borns, on the other hand, appears to be influenced primarily by the activities of the subjects' parents.

In any event, the findings indicate that future studies of birth order and achievement should control for parental influence, sibling sex, and age space. Family constellation groups (e.g., OB, YBS, etc.) should be studied separately, as they appear to be influenced in different degrees as well as in different ways (e.g., positively versus negatively) by the same factor.

D. WIFE'S FAMILY CONSTELLATION

The findings suggest that future studies of birth order and achievement should control for the subject's wife's family constellation, including sibling sex, age space, and family size. In this way, an adequate judgment may be made regarding the effect of complementarity[94] on achievement.

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[94]Including full complementarity, partial rank- or sex-conflict, and full rank- and sex-conflict.

APPENDIX A

GLOSSARY

DEPENDENT VARIABLES

1. Academic Achievement Criterion

The academic achievement criterion used in this study was the subject's Quality Point Rating (QPR), a numerical measure of a student's academic performance at the Naval Postgraduate School. The letter grade achieved in a course is assigned a quality point number which ranges from four for an "A" grade to one for a "D." When the quarter hours value of a course is multiplied by the quality point number of the student's grade, a quality point value for the student's work in that course is obtained. The sum of the quality point values for all courses divided by the sum of the quarter hours of all courses yields the QPR. Thus, a student achieving a QPR of 3.0 has maintained a "B" average in all courses undertaken with a proper weight assigned for course hours.

2. Occupational Achievement Criteria

a. Early Promotion. -- In order to understand the concept of early promotion, it is first necessary to appreciate the meaning of promotion zones. The Secretary of the Navy is required by law to establish a promotion zone of officers for promotion to the next higher grade as of the date he convenes a selection board to consider officers of that grade for promotion. The size of a promotion zone is a

function of known and expected variances which will exist in the ensuing twelve months and the application of the forced attrition variable. Consequently, the promotion zone always consists of a number of those eligible officers most senior in the grade under consideration who have not previously been in a promotion zone to the next higher grade.

Of the total established number to be promoted, the selection board is authorized by Law, Title 10, U. S. Code, to select five per cent from beneath the zone. Officers below the zone are eligible for selection only if they have completed the minimum number of years required in their present grade.

Thus, early promotion is defined as promotion of those officers selected who are beneath the established zone but who have met the selection eligibility requirements of minimum years of service in their present grade.

b. Passed Over. -- Passed over is a vernacular expression which describes the status of an officer who has not been promoted on time with his contemporaries. All officers in and above the promotion zone discussed above who are not recommended for promotion to the next higher grade are failed of selection and referred to as "passed over." Those eligible below the zone who are not recommended are not failed of selection.

APPENDIX B

COVER SHEET OF QUESTIONNAIRE

This questionnaire is part of a study of current recruitment, selection and retention programs. To ensure complete and accurate results, all U. S. officers attending the Naval Postgraduate School are being asked to participate in this project.

Please place your completed questionnaire in the box marked "Selection Research," located in the NPGS Student Mail Center.

Individual findings will of course be kept in strictest confidence; a summary of findings in the form of grouped statistics will be printed in early April. This data will not reflect the responses of any single individual. If you desire a personal copy of the summary, place an "X" here (____).

Thank you for your cooperation.

APPENDIX C

QUESTIONNAIRE

for office use only /__/__/__/

1. Age: _____ yrs. /__/__/

2. What is your family status? (circle one) /__/

1 divorced, widower, unmarried over 30
2 single under 30
3 married under 30, no children
4 married over 30, no children
5 married, youngest child under 6 yrs.
6 married, youngest child 6-12 yrs.
7 married, youngest child 13-18 yrs.
8 married, youngest child over 18 & single
9 married, children married
10 grandparent

3. Your education in total years of schooling: __yrs. /__/__/

4. Where were you born? _____ /__/__/
(city, state, country

5. In what size community were you brought up in? /__/

1 farm/rural
2 a town of less than 10,000 people
3 a town with 10-50,000 people
4 a city with 50-100,000 people
5 a city of more than 100,000 people

6. Years of active enlisted service, if any: ___yrs. /__/__/

7. Years of active duty since commissioning: ___yrs. /__/__/

8. How many quarters have you completed at NPGS? __ /__/__/

9. What is your cumulative QPR (including both graduate and undergraduate work) at NPGS? ____ /__/__/__/

10. What is your curriculum number (or name)? ___ /__/__/__/

11. What was the source of your commission? /__/

1 service academy
2 ROTC
3 OCS
4 AOC
5 NAVCAD
6 ROC
7 _____

12. Your current rank: /__/

1 Warrant officer
2 O-1
3 O-2
4 O-3
5 O-4
6 O-5 or higher

13. What is your designator/community? _____ /__/__/__/

14. Have you ever been promoted early? (do not include spot promotions; do include selections below the zone) /__/

1 yes
2 no

15. Have you ever failed to be promoted with your contemporaries? /__/

1 yes
2 no

16. What is your favorite color? _____ /__/

17. Would you describe yourself as a religious person? /__/

1 yes
2 moderately
3 no

* * * * * * * * * * * * * * * * * * * *

The following items pertain to your childhood years. For purposes of consistency, "childhood years" are defined as the period from birth to age 12. A "brother" or a "sister" is defined as any child who lived with you during your childhood. If any questions do not apply, leave them blank.

18. How many of your brothers and sisters were born before you? _____ /__/

19. What was the total number of children (including yourself) in your family? _____ /__/

If you were the oldest child, please skip to question 23.

If you were an only child, please skip to question 27.

20. The next person older than me was: /__/

1 a brother
2 a sister

21. How much older than you was he or she? ___yrs. /__/

22. How many years of education did your next older brother/sister have? _____yrs. /__/__/

23. The person next younger to me was: /__/

1 a brother
2 a sister

24. How much younger than you was he or she? ___yrs. /__/

25. How many years of education did your next younger brother/sister have? _____yrs. /__/__/

26. Have you had more years of education than all of your brothers or sisters? /__/

1 yes
2 no

27. How many years of education did your father have? ____ yrs. /__/__/

28. How many years of education did your mother have? ____ yrs. /__/__/

29. Estimate your mother's age at the time of your birth: ____yrs. /__/__/

30. During your childhood, what was your family's approximate annual income? $_____ /__/__/

31. During your childhood, what was your father's occupation? _____ /__/

32. If any of the following family members passed away during your childhood, please indicate your age at the time:

1	father	your age:	___yrs./__/__/
2	mother		___yrs./__/__/
3	an older brother or sister		___yrs./__/__/
4	a younger brother or sister		___yrs./__/__/
5	N/A		/__/__/

33. Indicate how many of your 12 childhood years you were raised by each of the following: (total of all items is 12 yrs.)

1	raised by both parents, including adoptions, foster & step parents	___yrs./__/__/
2	raised by father only:	___yrs./__/__/
3	raised by mother only:	___yrs./__/__/
4	raised by other than a parent:	___yrs./__/__/

34. What was your parents' marital status when you were 12 yrs. old? /__/

1 married
2 separated
3 divorced
4 one or both deceased

* * * * * * * * * * * * * * * * * * * *

The remaining items pertain to your adult life.

35. What is your current marital status? /__/

1 single
2 married
3 divorced
4 divorced/remarried
5 widower

* * * <u>For married officers only</u>. If married more than once, questions pertain to your 1st wife only.

36. How old were you when you were first married? ___yrs. /__/__/

37. How old was your wife then? ___yrs. /__/__/

38. How many of your wife's brothers and sisters were born before her? _____ /__/

39. What was the total number of children (including your wife) in her family? ___ /__/

APPENDIX D

TABLE I PLACE OF BIRTH

The digits in this table were used in coding the response to question four on the questionnaire: "Where were you born?"

Digits	Geographic Area
1	New England Maine New Hampshire Vermont Massachusetts Rhode Island Connecticut
2	Middle Atlantic New York New Jersey Pennsylvania
3	East North Central Ohio Indiana Illinois Michigan Wisconsin
4	West North Central Minnesota Iowa Missouri North Dakota South Dakota Nebraska Kansas
5	South Atlantic Delaware Maryland District of Columbia Virginia West Virginia North Carolina South Carolina Georgia Florida

TABLE I (continued)

Digits	Geographic Area
6	East South Central Kentucky Tennessee Alabama Mississippi
7	West South Central Arkansas Louisiana Oklahoma Texas
8	Mountain Montana Idaho Wyoming Colorado New Mexico Arizona Utah Nevada
9	Pacific Washington Oregon California Alaska Hawaii
10	Canada
11	Guam/Philippines
12	Europe

TABLE II NAVAL POSTGRADUATE SCHOOL
CURRICULA NUMBERS

The digits in this table were used in coding the response to question ten on the questionnaire: "What is your curriculum number (or name)?"

Curriculum Number	Curriculum Name
000	Not Reported
360	Operations Research/ Systems Analysis
367	Computer Systems Management
372	Meteorology
380	Advanced Science
460	Engineering Science
461	Baccalaureate (B.A./B.S.)
521	Nuclear Science
530	Ordnance Systems Engineering
535	Engineering Acoustics
570	Naval Engineering
590	Engineering Electronics
600	Communications Engineering
610	Aeronautical Engineering
620	Communications Management
816	Systems Acquisition Management
817	Management
825	Naval Intelligence

TABLE III OFFICER DESIGNATORS

Naval Officers are assigned a four digit numerical designator for accounting and statistical purposes. The first three digits indicate the general category within which the officer performs, and the fourth digit indicates the officer's official status. Only the first three digits were used in coding the response to question thirteen on the questionnaire: "What is your designator/community?"

First Three Digits	Officer Category
Line (unrestricted in the performance of duty)	
000	Other than a U.S. Naval Officer, i.e. U.S. Army, Air Force or Coast Guard
110	A line officer
111	A line officer who is qualified in surface warfare
112	A line officer who is qualified in submarine warfare
131	A line officer who is qualified for duty involving flying heavier-than-air, or heavier and lighter-than-air type aircraft as a pilot
132	A line officer, a member of the aeronautical organization who is a flight officer
Line (restricted in the performance of duty)	
140	An engineering duty officer
150	An aeronautical engineering duty officer

TABLE III (continued)

First Three Digits	Officer Category
161	A special duty officer (cryptology)
163	A special duty officer (intelligence)
180	A special duty officer (geophysics)
Staff Corps	
230	A Medical Service Corps officer
310	A Supply Corps officer
510	A Civil Engineer Corps officer
Line (limited duty)	
600	A limited duty officer
700	A Warrant officer

TABLE IV COLOR PREFERENCES

The digits in this table were used in coding the response to question sixteen of the questionnaire: "What is your favorite color?"

Digit	Color
0	No Preference
1	Blue
2	Green
3	Red
4	Grey
5	Black
6	Brown
7	Purple
8	Yellow/Gold/Orange

TABLE V FATHER'S OCCUPATION[96]

The digits in this table were used in coding the response to question thirty-one on the questionnaire: "During your childhood what was your father's occupation?"

Rating Number	7	6	5
Rating Name	Upper Class	Lower-upper Class	Upper-middle Class
Professionals	Lawyers, doctors, dentists, engineers, judges, high-school superintendents, veterinarians, ministers (graduated from divinity school), chemists, etc., with post-graduate training, architects	High-school teachers, trained nurses, chiropodists, chiropractors, undertakers, ministers (some training), newspaper editors, librarians (graduate)	Social workers, grade-school teachers, optometrists, librarians (not graduated), undertaker's assistants, ministers (no training)
Proprietors and Managers	Businesses valued at $75,000 and over	Businesses valued at $20,000 to $75,000	Businesses valued at $5,000 to $20,000
Business Men	Regional and divisional managers of large financial and industrial enterprises	Assistant managers and office department managers of large businesses, assistants to executives, etc.	All minor officials of businesses

[96]Warner, W. Lloyd: Meeker, Marchia; and Eells, Kenneth, Social Class in America, p. 140-141, Science Research Associates, Inc., 1949. (It was considered that a work of this period would be particularly appropriate in classifying the occupations of the fathers of the respondents during their childhood years.)

Rating Number	7	6	5
Rating Name	Upper Class	Lower-upper Class	Upper-middle Class
Clerks and Kindred Workers, Etc.	Certified Public Accountants	Accountants, salesmen of real estate, of insurance, postmasters	Auto salesmen, bank clerks and cashiers, postal clerks, secretaries to executives, supervisors of railroad, telephone etc., justices of the peace
Manual Workers			Contractors
Protective and Social Workers			
Farmers	Gentleman farmers	Large farm owners, farm owners	

Rating Number	4	3	2	1
Rating Name	Middle Class	Lower-middle Class	Upper-Lower Class	Lower Class
Professionals				
Proprietors and Managers	Businesses valued at $2,000 to $5,000	Businesses valued at $500 to $2,000	Businesses valued at less than $500	
Business Men				
Clerks and Kindred Workers, Etc.	Stenographers, bookkeepers, rural mail clerks, railroad ticket agents, sales people in dry goods stores,etc.	Dime store clerks, hardware salesmen, beauty operators, telephone operators		
Manual Workers	Factory foremen, electricians, plumbers, carpenters, watchmakers	Carpenters, plumbers, electricians (apprentice) timekeepers, line-men, telephone or telegraph, radio repairmen, medium skill workers	Moulders, semi-skilled workers, assistants to carpenters, etc.	Heavy labor, migrant work, odd-job men, miners
Protective and Service Workers	Dry cleaners, butchers, sheriffs, railroad engineers and conductors	Barbers, firemen, butcher's apprentices, practical nurses, policemen, seamstresses, cooks in restaurants,bartenders	Baggage men, night policemen and watchmen, taxi and truck drivers, gas station attendants, waitresses in restaurants	Janitors, scrubwomen, newsboys
Farmers		Tenant farmers	Small tenant farmers	Migrant farm laborers

APPENDIX E

BIRTH ORDER ANALYSIS (RANK GROUPS)

Group: LIEUTENANT-COMMANDERS, NO ENLISTED SERVICE (N=103)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables		
Passover	Over thirty, married, no children	Only child	ROTC graduate
Simple r	.398	.231	.185
Signif.	p<.001	p<.01	p<.05

TABLE I

Group: LIEUTENANTS, NO ENLISTED SERVICE (N=206)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables		
QPR	OBS	Married	ROTC graduate
Simple r	.141	.186	.191
Signif.	p<.05	p<.01	p<.005

TABLE II

Dependent Variable	Independent Variables		
Passover	NAVCAD	YBS	Married
Simple r	.496	.214	- .194
Signif.	p<.001	p<.001	p<.005

TABLE III

REGRESSION STATISTICS FOR LIEUTENANTS WITH SEVEN OR MORE YEARS OF COMMISSIONED SERVICE AND NO ENLISTED SERVICE (N=97)

Dependent Variable: QPR

Independent Variables	r^2	Cumul. r^2	B	Beta	'F' Statistic	Deg. of freedom	Signif. level
Single, under thirty	.088	.088	-.860	-.330	8.212	1/85	p<.005
ROTC graduate	.091	.179	.250	.290	9.168	2/84	p<.001
Divorced, remarried	.072	.251	-.499	-.270	9.272	3/83	p<.001
Middle-born (MB)	.046	.297	-.220	-.188	8.662	4/82	p<.001
Early promotion	.039	.336	-.340	-.180	8.189	5/81	p<.001
Years education	.022	.358	-.038	-.140	7.435	6/80	p<.001
Married, yngst child under 6	.020	.378	.107	.130	6.853	7/79	p<.001
Age	.005	.383	-.025	-.070	6.061	8/78	p<.001

TABLE IV

Constant = 4.695

Regression Equation:

Calculated QPR = 4.695 - .86 X (Single, under thirty) + .25 X (ROTC graduate) - .499 X (Divorced, remarried) - .22 X (Middle-born) - .34 X (Early promotion) - .038 X (Years education) + .107 X (Married, youngest child under six) - .025 X (Age)

REGRESSION STATISTICS FOR LIEUTENANTS WITH SEVEN OR MORE YEARS OF COMMISSIONED SERVICE AND NO ENLISTED SERVICE (N=97)

Dependent Variable: Passover

Independent Variables	r^2	Cumul. r^2	B	Beta	'F' Statistic	Deg. of freedom	Signif. level
NAVCAD	.242	.242	.875	.445	30.36	1/95	p<.001
Divorced, remarried	.052	.294	.240	.238	19.597	2/94	p<.001
YBS	.024	.318	.113	.165	14.496	3/93	p<.001

TABLE V

Constant = .012

Regression Equation:

Calculated Passover = .012 + .875 X (NAVCAD) + .24 X (Divorced, remarried) + .113 X (YBS)

Group: LIEUTENANTS WITH SEVEN OR MORE YEARS OF COMMISSIONED SERVICE AND NO ENLISTED SERVICE

Analysis: Cross-validation of predicted and actual dependent variables, using Pearson correlation

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Variables: Calculated QPR, Actual QPR

Results: (N=23)

$r = .4263$

$p<.05$

Variables: Calculated Passover, Actual Passover

Results: (N=24)

$r = .6566$

$p<.001$

FIGURE 1

APPENDIX F

DESIGNATOR FINDINGS

Group: 1100 DESIGNATOR (N=20)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables						
QPR	OBS	Years between subject and next older sister	Only-born wife	mar-ried	Mother's educa-tional level	Family size	Un-mar-ried
Simple r	.583	.579	.469	.380	-.586	-.456	-.380
Signif.	p<.005	p<.05	p<.05	p<.05	p<.005	p<.05	p<.05

TABLE I

Group: 1110 DESIGNATOR (N=139)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables	
Passover	YBS	Divorced
Simple r	.189	.249
Signif.	$p<.05$	$p<.001$

TABLE II

Group: 1120 DESIGNATOR (N=38)

Analysis: Multiple Regression

Dependent Variable: QPR

Constant = 4.26

Independent Variable	r^2	Cumul. r^2	B	Beta	'F' Statistic	Deg. of freedom	Signif. level
Number of years between subject and next younger sibling	.276	.276	-.085	-.444	8.391	1/22	p<.01
Married parents	.193	.469	-.404	-.383	9.292	2/21	p<.01
Community size	.127	.597	-.063	.214	9.866	3/20	p<.01
YBB	.051	.648	-.244	-.249	8.749	4/19	p<.01
ROTC graduate	.048	.697	.101	.141	8.262	5/18	p<.01
Only-born wife	.015	.712	-.350	-.157	7.004	6/17	p<.01
OCS graduate	.005	.717	-.104	-.124	5.798	7/16	p<.01
Age	.007	.724	-.010	-.104	4.927	8/15	p<.01

TABLE III

Group: 1310 DESIGNATOR, BACHELOR'S PROGRAM (N=33)

Analysis: Pearson Correlation

Dependent Variable	Independent Variables	
QPR	Number of older siblings	YBB
Simple r	(N=14) - .532	- .405
Signif.	p<.05	p<.01

TABLE IV

Group: 1320 DESIGNATOR (N=38)

Analysis: Pearson Correlation

Dependent Variables	Independent Variables				
Passover	Only child	Only-born wife	Age subject married	ROTC graduate	Family size
Simple r	1.00	.697	.694	.379	- .280
Signif.	p<.001	p<.001	p<.001	p<.01	p<.05

TABLE V

APPENDIX G

BIRTH ORDER ANALYSIS (BIRTH ORDER GROUPS)

Group: OLDER BROTHERS OF BROTHERS (OBB, N=109)

Analysis: Multiple Regression

Dependent Variable: QPR

Constant = 3.69

Independent Variable	r^2	Cumul. r^2	B	Beta	'F' Statistic	Deg. of freedom	Signif. level
Community size	.043	.043	-.051	-.187	4.835	1/107	p<.05
Family size	.030	.073	-.048	-.169	4.202	2/106	p<.05
Early promotion	.022	.095	-.216	-.154	3.721	3/105	p<.05

TABLE I

Dependent Variable: Passover

Constant = .039

Independent Variable	r^2	Cumul. r^2	B	Beta	'F' Statistic	Deg. of freedom	Signif. level
Years of enlisted service	.181	.181	.010	.395	7.113	1/32	p<.05
Mother's education level	.014	.195	-.007	-.122	3.772	2/31	p<.05

TABLE II

Group: OLDER BROTHERS OF BROTHERS (OBB, N=109)

Analysis: Multiple Regression

Dependent Variable: Early Promotion

Constant = -.608

Independent Variable	r^2	Cumul. r^2	B	Beta	'F' Statistic	Deg. of freedom	Signif. level
Age subject married	.047	.047	.023	.220	5.383	1/108	p<.05
Community size	.045	.093	.035	.183	5.507	2/107	p<.01
ROTC graduate	.030	.123	-.105	-.172	4.991	3/106	p<.01
Parents separated	.030	.153	.368	.179	4.769	4/105	p<.005
Married, youngest child under six years	.026	.179	.084	.162	4.554	5/104	p<.005

TABLE III

Group: OLDER BROTHERS OF SISTERS (OBS, N=97)

Analysis: Multiple Regression

Dependent Variable: Early Promotion

Constant = .181

Independent Variable	r^2	Cumul. r^2	B	Beta	'F' Statistic	Deg. of freedom	Signif. level
No death in family	.087	.087	.247	.288	9.079	1/95	p<.005
Father's education level	.024	.112	-.012	-.156	5.898	2/94	p<.005

TABLE IV

Dependent Variable: Passover

Constant = -.015

Independent Variable	r^2	Cumul. r^2	B	Beta	'F' Statistic	Deg. of freedom	Signif. level
NAVCAD	.239	.239	.480	.480	29.93	1/95	p<.001
Divorced, remarried	.165	.404	.325	.396	31.91	2/94	p<.001
Last-born wife	.041	.446	.069	.204	24.93	3/93	p<.001

TABLE V

APPENDIX H

KEY TO IBM CARD DATA DECK

Column Number	Variable Name	Item Description
1-3	NUMBER	Respondent Identity Number
4	blank	
5-6	AGE	Age of the respondent in years
7	FAMSTAT	Family Status; response to question two: "What is your family status?"
8-9	EDUCAT	Education of the respondent in total years of schooling
10-11	WHERBORN	Where Born; response to question four: "Were were you born?" (See APPENDIX DTABLE I)
12	SIZECOM	Size Community; response to question five: "In what size community were you brought up in?"
13-14	ENLSERV	Enlisted Service of the respondent in years (00 -- if the respondent had no enlisted service)
15-16	COMSERV	Years of active duty since the respondent's commissioning
17-18	QTRSNPS	Quarters at NPGS; response to question eight: "How many quarters have you completed at NPGS?"
19-21	CUMQPR	Cumulative QPR; response to question nine: "What is your cumulative QPR (including both graduate and undergraduate work) at NPGS?" (e.g. 3.15)
23-25	CRICNUM	Curriculum Number of the respondent (See APPENDIX D TABLE II)
26	COMSORCE	Source of the respondent's commission (7 -- Integration Officer Program, 8 -- Other; responses 1-6 as per the questionnaire)

Column Number	Variable Name	Item Description
27	RANK	Current rank of the respondent
28-30	DESIGNAT	Designator; response to question thirteen: "What is your designator/community?" (See APPENDIX D TABLE III)
31	ERLYPROM	Early Promotion; response to question fourteen: "Have you ever been promoted early?"
32	PASSOVER	Pass over; response to question fifteen: "Have you ever failed to be promoted with your contemporaries?"
33	COLOR	Favorite color of the respondent (See APPENDIX D TABLE IV)
34	RELIGUS	Religious; response to question seventeen: "Would you describe yourself as a religious person?"
35	OLDRSIBS	Older siblings; response to question eighteen: "How many of your brothers and sisters were born before you?"
36	FAMSIZE	Family size; response to question nineteen: "What was the total number of children (including yourself) in your family?"
37	OLDRSEX	Older sex; response to question twenty: "The next person older than me was: (1) a brother (2) a sister (0) not applicable."
38	YRSOLDR	Years older; response to question twenty-one: "How much older than you was he or she?"
39-40	ELDREDU	Elder's education; response to question twenty-two: "How many years of education did your next older brother/sister have?"
41	YNGRSEX	Younger sex; response to question twenty-three: "The person next younger to me was: (1) a brother (2) a sister (0) not applicable."

Column Number	Variable Name	Item Description
42	YRSYNGR	Years younger; response to question twenty-four: "How much younger than you was he or she?"
43-44	YNGREDU	Younger's education; response to question twenty-five: "How many years of education did your next younger brother/sister have?"
45	MOREDUC	More education; response to question twenty-six: "Have you had more years of education than all of your brothers and sisters?"
46-47	PAEDUC	Father's education; response to question twenty-seven: "How many years of education did your father have?"
48-49	MAEDUC	Mother's education; response to question twenty-eight: "How many years of education did your mother have?"
50-51	MASAGE	Mother's age; response to question twenty-nine: "Estimate your mother's age at the time of your birth."
52-53	FAMINCOM	Family's income; response to question thirty: "During your childhood, what was your family's annual income?" (measured in thousands of dollars)
54	FROCCUPA	Father's occupation; response to question thirty-one: "During your childhood, what was your father's occupation?" (See APPENDIX D TABLE V)

Note: Column Numbers 55-64 refer to question thirty-two: "If any of the following family members passed away during your childhood, please indicate your age at the time:"

55-56	AGEPADIE	Age of the respondent at the time of father's death
57-58	AGEMADIE	Age of the respondent at the time of mother's death
59-60	AGELDIE	Age of the respondent at the time of the death of an older brother or sister

Column Number	Variable Name	Item Description
61-62	AGEYNGDI	Age of the respondent at the time of the death of a younger brother or sister
63-64	NOFAMDIE	No deaths in the respondent's family during his childhood years

Note: Column Numbers 65-72 refer to question Thirty-three: "Indicate how many of your childhood years you were raised by each of the following: (total of all items is 12 years.)"

65-66	BOTHRAIS	Number of years the respondent was raised by both parents, including adoptions, foster and step parents
67-68	PARAISE	Number of years the respondent was raised by his father only
69-70	MARAISE	Number of years the respondent was raised by his mother only
71-72	OTHRAIS	Number of years the respondent was raised by someone other than a parent
73	PARMARIT	Parents' marital status; response to question thirty-four: "What was your parents' marital status when you were twelve years old?"
74	SUBMARIT	Subject's marital status; response to question thirty-five: "What is your current marital status?"
75-76	AGEMARID	Age married; response to question thirty-six: "How old were you when you were first married?"
77-78	WIFEAGE	Wife's age; response to question thirty-seven: "How old was your wife then?" (at the time of the respondent's marriage)
79	WIFELDR	Wife's elder siblings; response to question thirty-eight: "How many of your wife's brothers and sisters were born before her?"
80	WIFAMSIZ	Wife's family size; response to question thirty-nine: "What was the total number of children (including your wife) in her family?"

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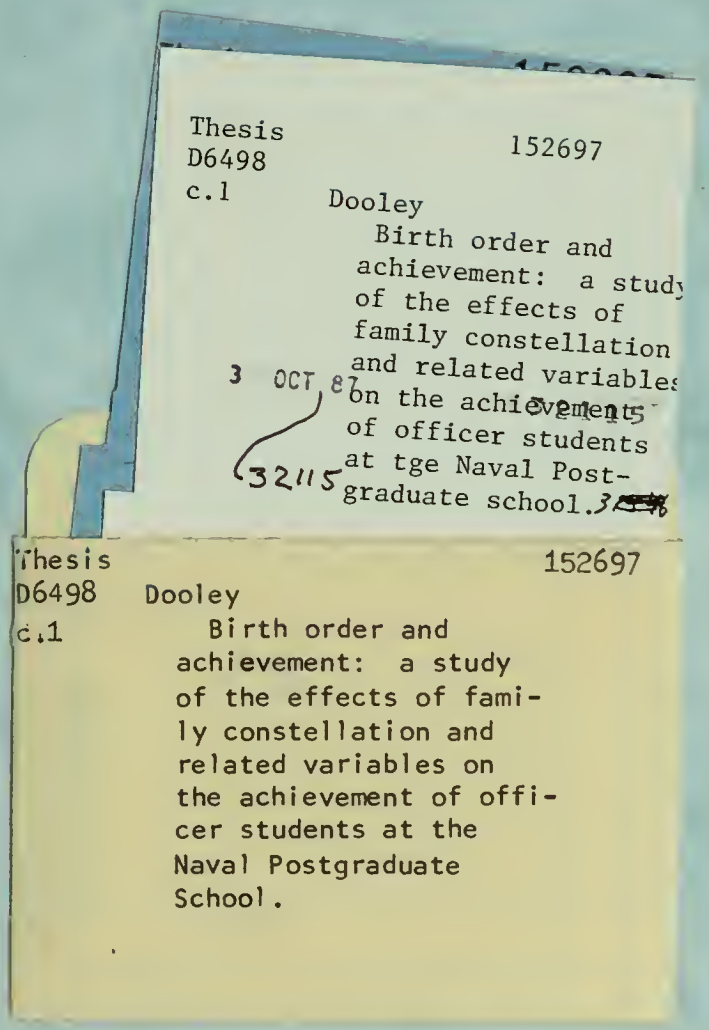

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Birth order and achievement: a study of the effects of family constellation and related variables on the achievement of officer students at the Naval Postgraduate School.